Navigation

Reading the map

The standard 1:25000 maps that we use locally include features that describe the terrain. You should be able to identify:
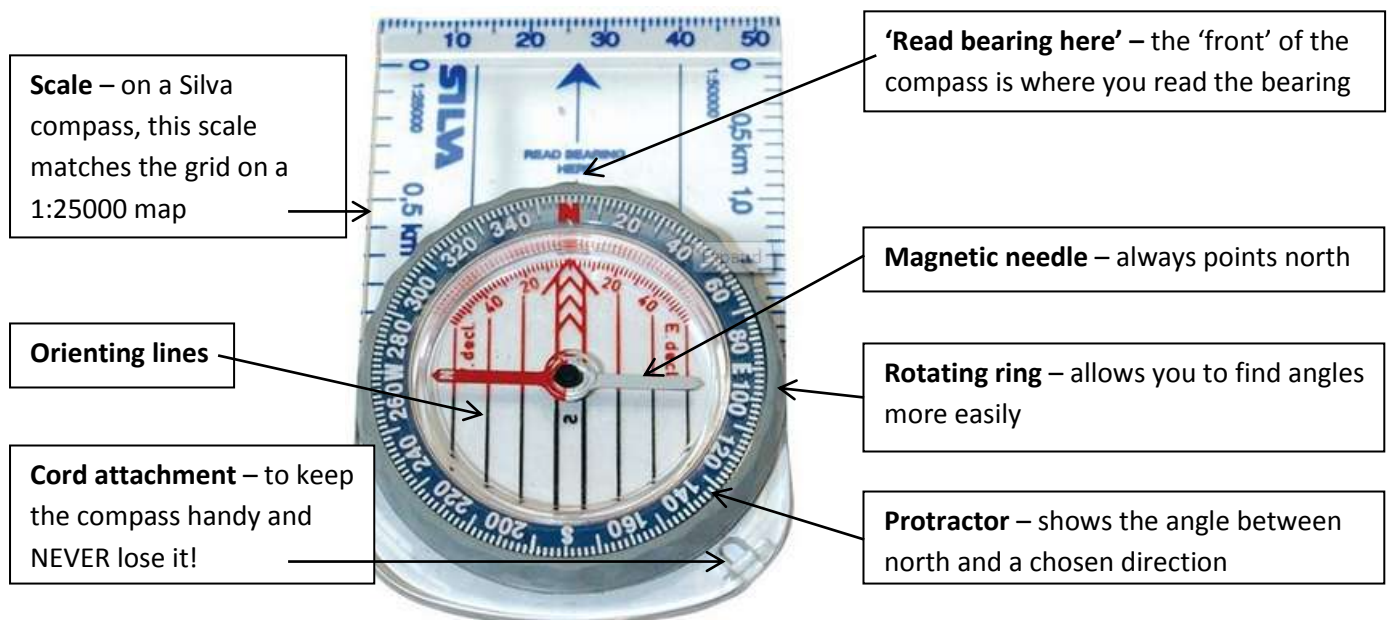
- Contour lines – the contour interval – grid - grid references - latitude and longitude – scale
- True north (the direction of the north pole), grid north and magnetic north (where the compass needle points –this is the magnetic variation or declination)
- A grid square on a 1:25000 map is 1km.

With experience, you can use the contours to identify features of the landscape such as:

- Saddle – Knoll – ridge – spur – watershed – cliff – creek and direction of flow – flat areas

Compass

The type of compass commonly used for bush navigation is an orienteering compass. There are quite a few useful features:

Scale – on a Silva compass, this scale matches the grid on a 1:25000 map

Orienting lines

Cord attachment – to keep the compass handy and NEVER lose it!

'Read bearing here' – the 'front' of the compass is where you read the bearing

Magnetic needle – always points north

Rotating ring – allows you to find angles more easily

Protractor – shows the angle between north and a chosen direction

What do you use a compass for?

Many things, but usually you will be doing one of three things:

1. Orienting the map

Most people can read a map more easily if north on the map matches actual north on the ground. This way, the features you can see on the map will match reality. To make this happen:

- Turn the compass until all the norths line up (it's easier to explain if you do this!)
- (Adjust for magnetic variation)
- Put the compass on the map
- Turn the **MAP** until the **grid lines** on the map and the **side of the compass** line up
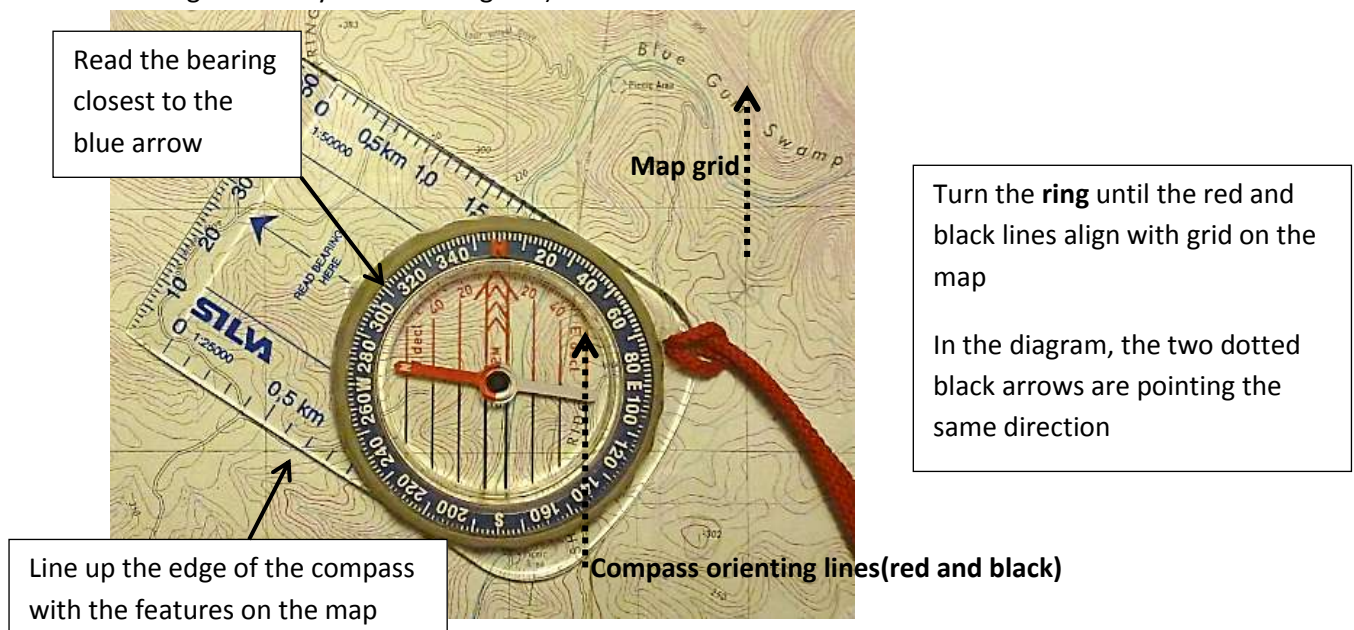
2. Find out where to go ('take a bearing')

A compass and a map can be used to make sure you are walking in the right direction. (**This usually assumes that you know where you are when you start**!)

To do this:

- Find your location on the map
- Find an easily identifiable feature that you want to reach (usually less than about 1km)
- Put the compass on the map and use the edge to line up the two points.
- Turn the ring until the **orienting lines** (the black and red lines on the rotating plate) match the grid lines on the map.
- The bearing is the number next to the blue arrow (where it says 'READ BEARING HERE')
- Adjust for magnetic variation – you are taking the compass OFF the map – so **subtract** (ie make the bearing smaller by about 12 degrees)

Read the bearing closest to the blue arrow

Map grid

Turn the **ring** until the red and black lines align with grid on the map

In the diagram, the two dotted black arrows are pointing the same direction

Line up the edge of the compass with the features on the map

Compass orienting lines (red and black)

To use this bearing:

- Don't turn the ring (it has your bearing!)
- Hold the compass with the blue arrow pointing away from you
- Turn (ie **move your feet**!) until the magnetic needle matches the red arrow on the compass
- Keep walking in a straight line, checking the compass regularly

Hint: Line up the bearing with a feature, eg a prominent gum tree, and walk towards that. Repeat these steps till you get there. In thick bush, a second person walking 10m or so behind with the same bearing can help keep on course.

3. Find out where you are

This requires a lot more experience in identifying features and understanding compass bearings.

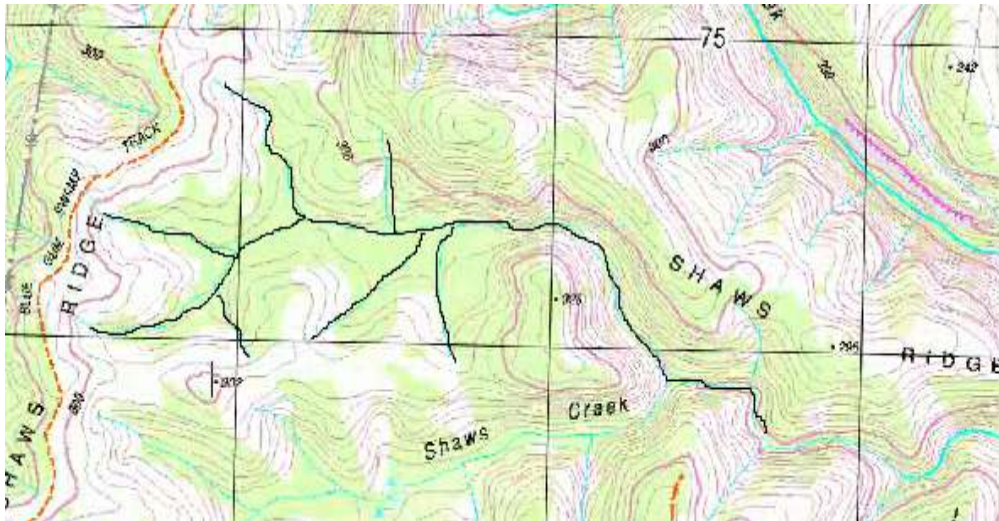Using the compass to work out where you can involve one of the following techniques (there are others):

"Triangulation"

- taking a compass bearing to a prominent point (assuming you can identify something with confidence!)
- Putting that bearing back on the map (the reverse of the step above). To be really accurate, draw a line with a pencil on the map
- Repeat this for at least one other feature.
- You are located at the point where the lines intersect. Easy!

Checking bearings

A more common scenario is using a compass to identify (or check) that you are where you think you are, usually using a well defined feature such as a ridge or a creek.

For example, the map extract below shows a number of creeks. Assume you've reached a creek, but you're not sure which bit you are on.
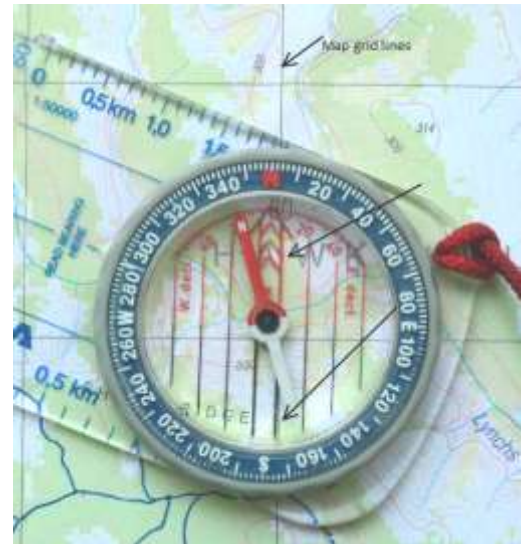

- Take a compass bearing looking down (or up) the creek. It's best to stand IN the creek and try to take an **average** bearing – ie ignore minor bends if you can.

  - Hold your compass with the front of the compass pointing in the general direction of the creek

  *- Turn the RING until the **needle** lines up with the **orienting** lines (Don't move the compass, turn the ring)*

  - Read the bearing off the compass (where it says 'read bearing here')

  - The photo shows a bearing of, say 280 (it's actually 290 but I need 280 for the example).

- You are now going to put the compass ON the map – so **add** the magnetic deviation (now 290).
- Line the orienting lines to the map grid lines (the thin black ones)
- Don't worry about the creeks, just get the compass lined up with the grid lines

- **NOW**, move the compass around the map, keeping it in line with the grid, until you find a part of the creek with the same angle as the **side** of the compass (you can also use the blue lines at the front of the compass) .
- In this case, the only part of the creek system which matches the angle on the compass is shown with the black arrows below:
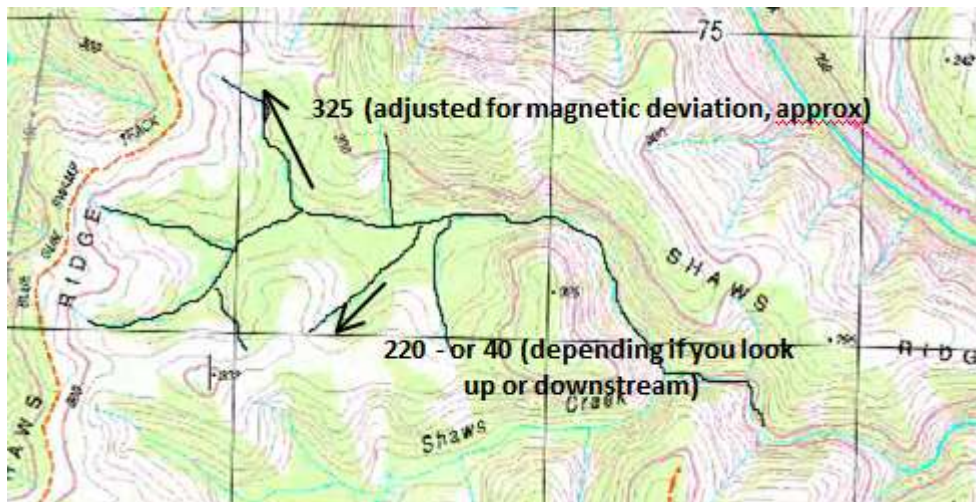

This technique can be also used to check you are on the correct ridge.

Note that you are working to +/- 10 degrees. You can't be – and you don't often need to be – more accurate than this. For example, notice that there is only one side creek in the system that has a bearing of between 280 and 300.

Try it – measure the angle (the bearing) of each creek in the system below.

(put your compass on the map, line the edge up with a creek. Turn the ring until the orienting lines match the grid lines). The bearings on a couple of creeks have been given as examples.)
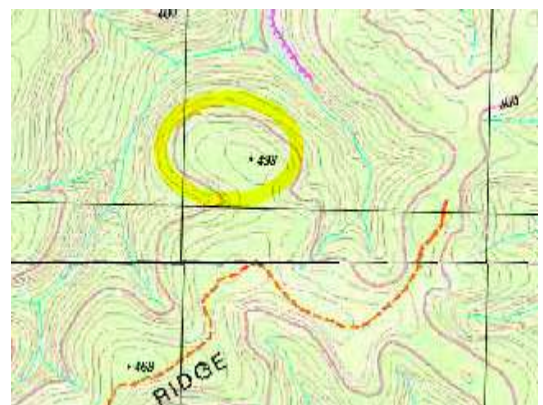

"Aspect of slope"

A common challenge in navigation is to be on the edge of a hill or escarpment that ends in a radius. You need to know where, along the radius of the escarpment, you are.

For example, you at the edge of a slope in the area shown. You could be anywhere on the yellow line shown in the map.

You can use the **direction of slope of the hill** in front of you to check your location.

- Point the compass directly **down** the slope and take the bearing.
- In this example, say your compass bearing shows that the steep part of the slope is running at 315 (NW) away from where you are standing.
- Adjust for magnetic deviation (**add** 11 degrees)
- Put your compass on the map, and line up the orienting lines with the grid.
- Find the part of the hill where the steep part of the slope matches the side of the compass.
- The black arrow shows this. You are at the beginning of the black arrow.

And finally

Adjusting for magnetic deviation

In real life, bearings are usually accurate to about +/- 5 degrees. However, magnetic deviation between map north and magnetic north in the Blue Mountains is around 11 degrees and should be taken into account.

A rule of thumb is:
- Take the compass **OFF** the map, **SUBTRACT** the deviation (ie make the bearing **smaller**)
- Put the compass **ON** the map, **ADD** the deviation (ie make the bearing **bigger**)

Example 1

On the map below, you want to take a bearing from the first to the second knoll.

- Line the edge of the compass up with the two knolls.
- Turn the ring until the orienting lines (compass) match the grid lines (map)
- You are taking the compass **OFF** the map, so **subtract** the magnetic deviation.
- The bearing you are working out from the map is **20**
- You will take the compass OFF the map to use it,
- Subtract magnetic deviation of 11 degrees
- You need to walk on a bearing of **9** degrees (in practice, **10** will do!)

Example 2

You want to identify a creek by taking a bearing on the direction the creek runs.

- Stand in the creek (it's probably dry!)
- Point the front of the compass along the general direction the creek is flowing
- Turn the compass ring so the needle lines up with the red arrow.
- Read the bearing at the front of the compass

You will now need to match this bearing with the map

- You are putting the compass **ON** the map, so **ADD** magnetic deviation
- Turn the **compass** so the orienting lines match the grid lines
- Move the compass around the map until the side of the compass matches the direction of a creek

Try this?

The grid references below describe a course in an area to the east of Shaw's Ridge, Winmalee (Springwood 1:25000 topo map).

Plot these points on a map, and making sure you don't get lost, navigate between each point. This is run regularly as a beginner's navigation course for Springwood Bushwalking Club. The grid references are reproduced here as a convenience for any leader wishing to use this course for training.

Note that these are 6-figure grid references, meaning that the feature will be located in a 100m x 100m area to the east and north of the grid reference.

8-figure references are more accurate (to 10m), and are often used with GPS systems.

Springwood 1:25000 topo map - GDA references

Grid Reference	Description
788 728	Track junction
790 730	Knoll
792 733	Escarpment? Or cliff?
790 734	Creek junction
789 738	Spot height - knoll
797 738	Saddle
792 744	Creek junction
787 746	Saddle?

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